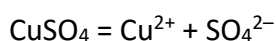
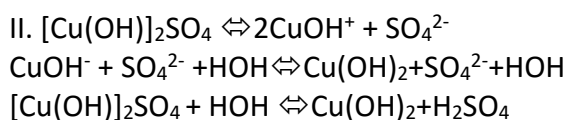
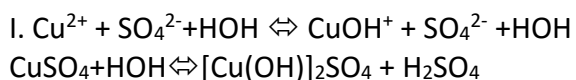


Question: What is the molar concentration of SO_4^{2-} anions in the solution consisting of 38.4 g of $\text{Cr}(\text{NO}_3)_2$ and 60.8 g of CuSO_4 which has been dissolved in sufficient water to make 245 mL of solution?

Solution:

The salts proposed in the task are salts of strong acids and weak bases, therefore hydrolysis takes place over the cation (Cr/Cu). And there is no effect on the amount of sulfate ions. When a salt dissolves in water, it dissociates to form ions (two stages):



CuSO_4 (solid) + HOH (liquid) \rightarrow Cu^{2+} (aq) + SO_4^{2-} (aq) + HOH (liquid), where s=solid, l=liquid, aq=aqueous solution in water. Amount (n) of $\text{SO}_4^{2-} = n \text{ CuSO}_4$. For solids, amount of substance (n) = m (mass of substance)/M (molar mass of substance), i.e. $n \text{ CuSO}_4 = m \text{ CuSO}_4 / M \text{ CuSO}_4 = 60.8 \text{ g} / 160 \text{ g/mol} = 0.38 \text{ mol}$. Then $n \text{ SO}_4^{2-} = n \text{ CuSO}_4 = 0.38 \text{ mol}$. Molar concentration of $\text{SO}_4^{2-} = n \text{ SO}_4^{2-} / V \text{ solution} = 0.38 \text{ mol} / 245 \text{ ml} = 0.00155 \text{ mol/ml}$ or 1.551 mol/l

Answer: **0.00155** mol/ml or **1.551** mol/L of SO_4^{2-} anions

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